

**TO:** Board Members

**THROUGH:** Kevin Patteson, Executive Administrator  
John Steib, Chief Deputy Executive Administrator  
Robert E. Mace, Deputy Executive Administrator, Water Science and Conservation  
Les Trobman, General Counsel  
David Carter, Manager, Contracting and Purchasing

**FROM:** Ruben S. Solis, Director, Surface Water Resources Division

**DATE:** February 4, 2014

**SUBJECT:** Funding for Studies of Environmental Flows in the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area

## **ACTION REQUESTED**

Authorize the Executive Administrator to negotiate and execute contracts in a total amount not to exceed \$312,500 on or before August 31, 2014, for studies of environmental flows in the Trinity and San Jacinto rivers and Galveston Bay basin and bay area.

## **BACKGROUND**

Senate Bill 3 (80<sup>th</sup> Texas Legislature, 2007) created a stakeholder-driven process for identifying and quantifying flows needed to maintain sound rivers and estuaries in Texas. The process calls for flow recommendations to be made by stakeholder groups and scientists representing 11 major basins in the state and their associated bays. The process next calls for the Texas Commission on Environmental Quality to develop flow standards to be applied to new water rights based on the flow recommendations and other factors. Lastly, the process contains an adaptive management component which calls for continued studies to validate and refine the environmental flow analyses, recommendations, and standards, and the strategies to achieve those standards. To date, stakeholder and science teams have been created for seven basin/bay systems; the Texas Commission on Environmental Quality has set standards for four basins/bay systems and is scheduled to set standards for three more systems by March 1, 2014; and adaptive management work plans have been submitted for six systems (Attachment A). Four remaining major basin systems have yet to be scheduled by the Environmental Flows Advisory Group for evaluation.

The Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Expert Science Team submitted its flow recommendations to the Texas Commission on Environmental Quality on November 30, 2009. The Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area Stakeholder Committee submitted its flow recommendations on May 31, 2010. The Texas Commission on Environmental Quality adopted flow standards for the system on April 20, 2011.

### **Our Mission : Board Members**

To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas

Carlos Rubinstein, Chairman | Bech Bruun, Member | Mary Ann Williamson, Member  
Kevin Patteson, Executive Administrator

The Trinity, San Jacinto Basin and Bay Area Stakeholder Committee submitted its Work Plan Report to the Environmental Flows Advisory Group on May 4, 2012. This work plan contains recommended studies and activities that will provide additional information for future rulemaking by the Texas Commission on Environmental Quality.

### **KEY ISSUES**

The 83<sup>rd</sup> Texas Legislature appropriated \$2 million to the Texas Water Development Board for continued studies of environmental flows and freshwater inflows to bays and estuaries in Section 18.03 of the Appropriations Bill. The bill requires that at least \$750,000 be used for projects in the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays basin, and that selection of the remaining basins be determined by the Science Advisory Committee and approved by the Environmental Flows Advisory Group. On September 10, 2013, the Science Advisory committee recommended that the Trinity-San Jacinto, Brazos, Colorado-Lavaca, and Nueces basins be provided funding of \$312,500 each. On January 14, 2014, the Environmental Flows Advisory Group approved this funding distribution. Unexpended funds as of August 31, 2014, are appropriated for the same purpose in the fiscal year beginning September 1, 2014.

The Trinity, San Jacinto Basin and Bay Area Stakeholder Committee appointed a subcommittee in July 2013 tasked with identifying priority work plan items and developing scopes of work and scoring criteria for those studies. Over the course of several meetings, tasks were identified and scopes of work were developed for the proposed studies. The full stakeholder committee approved the scopes of work and budgets, and on January 21, 2014 requested that the Texas Water Development Board fund the projects. Staff is prepared to administer contracting of these studies.

In summary, the Trinity, San Jacinto Basin and Bay Area Stakeholder Committee requests that three projects be funded for a total of \$312,500. Funds are requested for the following three studies:

- (a) Defining bioindicators for freshwater inflow needs studies (\$105,500),
- (b) Determination of freshwater inflow volume from the Trinity River into Trinity Bay (\$95,000), and
- (c) Trinity River evaluation of adopted Senate Bill 3 environmental flow standards (\$112,000).

Final funding amounts for these studies will be determined following review of the proposals received and final negotiations with the selected contractors. For more detailed descriptions of the proposed contracted studies, please see the project summaries in Attachment B.

### **RECOMMENDATION**

The Executive Administrator recommends approval of this item.

This recommendation has been reviewed by legal counsel and is in compliance with applicable statutes and Board rules.

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Les Trobman  
General Counsel

Attachment A: Summary of important dates and status of the Senate Bill 3 Process

Attachment B: Proposed studies for the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area

## ATTACHMENT A

### Summary of Important Dates and Status of the Senate Bill 3 Process (as of December 3, 2013)

Senate Bill 3 Basin	Science Team Report Submitted	Stakeholder Report Submitted	Rule Adoption Date	Rule Effective Date	Adaptive Management Work Plan – Date Submitted	Adaptive Management Work Plan – Date Approved	Review Cycle	First Review of Standards (Determined by TCEQ Effective Date unless otherwise noted)
Sabine- Neches	November 30, 2009	May 20, 2010	April 20, 2011	August 30, 2012 (due to an amendment to change review cycle from 10 to 5 years)	December 6, 2010 with addendum added on August 8, 2011	September 8, 2011	5 years	September 1, 2013 **(Determined so that review will be available to planning group)
Trinity-San Jacinto	November 30, 2009	May 31, 2010	April 20, 2011	May 15, 2011	May 4, 2012	<i>Not yet approved</i>	5 years*	To be aligned with regional water planning cycle, but date not specified in work plan
Brazos	March 1, 2012	September 1, 2012	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	November 13, 2013	<i>Not yet approved</i>	10 years*	<i>Not yet determined</i>
Colorado- Lavaca	March 1, 2011	August 30, 2011	August 8, 2012	August 30, 2012	June 26, 2012	<i>Not yet approved</i>	10 years	August 30, 2020
Guadalupe- San Antonio	March 1, 2011	September 1, 2011	August 8, 2012	August 30, 2012	May 25, 2012	<i>Not yet approved</i>	5 years*	August 30, 2017
Nueces	October 28, 2011	August 22, 2012	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	November 30, 2012	<i>Not yet approved</i>	5 years*	<i>August 30, 2018*</i>
Upper Rio Grande	July 30, 2012	<i>Not yet submitted</i>	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	<i>Not yet submitted</i>	<i>n/a</i>	<i>Not yet determined</i>	<i>Not yet determined</i>
Lower Rio Grande	July 30, 2012							

\*Review cycles have not been formally adopted by Texas Commission on Environmental Quality, but rather, were recommended by stakeholder committees in their respective work plans.

\*\* Information from 30 Texas Administrative Code, Section 298.290, Schedule for Revision of Standards,  
<http://www.tceq.texas.gov/assets/public/legal/rules/rules/pdfib/298c.pdf>

\*\*\* Schedule modified by Environmental Flows Advisory Group at their January 15, 2013 meeting.

## ATTACHMENT B

### PROPOSED STUDIES FOR THE TRINITY AND SAN JACINTO RIVERS AND GALVESTON BAY BASIN AND BAY AREA

#### **Defining bioindicators for freshwater inflow needs studies (\$105,500)**

Galveston Bay is under stress from development, greater demands on fisheries resources, and human activities leading to degradation of water quality. In order to develop a clear understanding of how to sustain ecosystem services for Galveston Bay, there is a need to evaluate previously identified bioindicators of ecosystem sustainability and to develop additional bioindicators. The bioindicators employed in the original analysis of freshwater inflow needs by the Trinity-San Jacinto-Galveston Bay Basin and Bay Expert Science Team (Trinity BBEST, 2009), including Atlantic rangia (*Rangia cuneata*), dermo parasitism of eastern oysters, and wild celery (*Vallisneria*), will be assessed for their efficacy, and additional research will be conducted to develop alternative bioindicators for future evaluation of the environmental flow regime.

Further evaluation of the originally selected bioindicators is warranted in light of both the need for additional information on *Rangia* and oyster parasitism and because of new information collected by Dr. Antonietta Quigg (Texas A&M University-Galveston) and others. For example, *Vallisneria* may no longer be appropriate due to its apparent disappearance during the 2011 drought. This project will involve an assessment of bioindicators established for other Texas bay systems as well as a literature review of bioindicators utilized in other Gulf Coast states in order to determine potential new bioindicators and the methods by which to define them. An evaluation procedure will utilize compiled historical data, multivariate analysis, and GIS spatial analysis. This effort will be informed by consultation with appropriate experts and the Basin and Bay Expert Science Team. Another facet of the evaluation will include field surveys of Galveston Bay to assess the relationship between freshwater inflows and the recovery of water quality and ecological factors following the extreme drought conditions of 2011. Evaluation of such ecological recovery will focus on monitoring phytoplankton biomass and community composition through monthly high spatial resolution sampling and monthly measurement of standard nutrient parameters. Project deliverables will include: (1) an assessment of the efficacy of the three original bioindicators, *Vallisneria*, *Rangia*, and oyster parasites; (2) descriptions and recommendations for alternate/additional bioindicators with great efficacy for measuring the effect of freshwater inflow on the bay ecosystem, and (3) a database of field measurements of nutrients and the phytoplankton community during the study and an analysis of the relationships among these parameters and freshwater inflow.

The proposed \$105,500 project with Texas A&M University at Galveston or similar cooperator will have immediate utility for the validation and refinement of the adopted Senate Bill 3 environmental flow standards and are consistent with several priority projects in the Adaptive Management Work Plan.

### **Determination of freshwater inflow volume from the Trinity River into Trinity Bay (\$95,000)**

Previous research by the United States Geological Survey, in conjunction with the Texas Water Development Board and the Texas Commission on Environmental Quality, on the Trinity River demonstrates that discharge data from upstream gages (*e.g.*, Trinity River at Romayor), commonly used to estimate freshwater inflows into Galveston Bay, may not represent actual discharge into Trinity Bay. This is a function of the influence of tides near the bay entrance and the dampening of river discharge due to overland runoff during high-flow events. These observations therefore necessitate an evaluation of individual discharge measurements and revised computations of discharge in the lowest reach of the Trinity River. Additionally, the concentrations of sediment and nutrients entering Galveston Bay from tributaries is not well known, particularly during high flow periods when substantial pulses from the Trinity River have the greatest potential to affect bay productivity.

This project will measure site specific information on river velocity and discharge plus nutrient and sediment concentrations over a range of hydrological conditions at Wallisville (gage #08067252) near the mouth of the river. The project will utilize an acoustic velocity meter to define tidal flow patterns at Wallisville. Data to be collected and analyzed will include stage, velocity, and acoustic signal strength. Two intensive sampling studies will collect instantaneous measurements of discharge and water quality (nutrient and sediment) parameters at the site and will evaluate the variability of nutrient and sediment concentration entering Galveston bay over a changing hydrograph. Additional correlations will be conducted between *in situ* field measurements of turbidity and acoustic backscatter and discrete nutrient and sediment concentrations in order to assess changes during a range of hydrological conditions. Project deliverables will include: (1) a summary of the continuous record of Trinity River discharge in the lower reach for the time period of the Wallisville gage operation; (2) results of sediment and nutrient analyses; and, (3) a preliminary evaluation of acoustic methods for measuring sediment and nutrient concentrations. The summary will describe how the discharge record provides a new perspective on the unique flow regime in the lowest reach of the Trinity River, which is distinct from the flow regime recorded by gages further upstream from the bay.

The proposed \$95,000 project with the United States Geological Survey or similar cooperator will fill information gaps concerning actual flow volumes from the mouth of the Trinity River into Galveston Bay and the nutrient and sediment content in that flow. Obtaining accurate freshwater inflow and sediment and nutrient input is imperative for regulating environmental flows for a sound ecological environment.

### **Trinity River evaluation of adopted SB3 environmental flow standards (\$112,000)**

To date, limited work has been completed to link adopted Senate Bill 3 environmental flow standards to instream physical and ecological characteristics. For example, few studies have been conducted to relate how each Senate Bill 3 study site location represents a characteristic river reach or how the adopted standards relate to the geomorphology, biology, and hydrology of the Trinity River. This project will collect site-specific field data and will analyze river characteristics at three Senate Bill 3 measurement sites in the Trinity River basin to determine

system responses to the adopted standards. River study sites will be in the vicinity of the Dallas (USGS stream gage #08057000), Oakwood (USGS stream gage #08065000), and Romayor (USGS stream gage #08066500) Senate Bill 3 study locations. Additional supplementary funding has been committed by the Trinity River Authority and the Tarrant Regional Water District to acquire and process LiDAR topography data and to integrate this data in order to build upon existing related studies initiated by the Trinity River Authority in 2011.

The proposed \$112,000 project with the Trinity River Authority of Texas or similar cooperator will deliver (1) a LiDAR topographic dataset, (2) a site-specific field dataset and (3) a final report detailing field work, modeling results, and analysis relative to the Texas Commission on Environmental Quality's adopted Senate Bill 3 environmental flow standards for these river locations. Senate Bill 3 funds will cover site-specific field study, analysis and reporting to relate physical stream characteristics to the adopted Senate Bill 3 environmental flow standards. The total cost of the project however is \$212,000. The Trinity River Authority has committed \$64,000, and Tarrant Regional Water District has committed \$26,000 towards the base LiDAR topographic dataset. Additionally, the Trinity River Authority has committed \$10,000 of *in-kind* services to support Senate Bill 3 field efforts.

## **References**

Trinity BBEST, 2009, Environmental Flows Recommendations Report: Final Submission to the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area Stakeholder Committee, Environmental Flows Advisory Group, and Texas Commission on Environmental Quality, Trinity and San Jacinto and Galveston Bay Basin and Bay Expert Science Team, November 2009, Austin, Texas, 235 p.